REMARKS

Reconsideration and allowance of the above-identified application are respectfully requested.

Claims 1-80 are currently pending, wherein claims 1, 2, 3, 8, 13-19, 31, 43, 52, 67, 72, 77 and 79 are independent.

Applicant notes with appreciation the allowance by the Patent Office of claims 8-12, 14, 16, 18 and 67-76.

Applicant further notes with appreciation the characterization by the Patent Office of claims 2 and 3 as being allowable if rewritten in independent form. Accordingly, Applicant hereby amends claims 2 and 3 merely to write these claims in independent form, including all of the features of the base claim and any intervening claims. These amendments do not narrow or otherwise limit the scope of the claims, are not made for any purpose related to patentability, and are fully supported by the present application. No new matter has been introduced by way of these amendments. It is respectfully submitted that claims 2 and 3 are allowable.

Applicant also notes with appreciation the characterization of independent claims 19 and 31, and corresponding dependent claims 20-30, 32-42 and 61-64, as being allowable if claims 19 and 31 were rewritten to overcome the objections set forth in the present Office Action.

Applicant notes with appreciation the characterization of independent claims 43, 52, 77 and 79, and corresponding dependent claims 44-51, 53-60, 65, 66, 78 and 80, as being allowable if claims 43, 52, 77 and 79 were rewritten to overcome the rejections set forth in the present Office Action.

Applicant further notes with appreciation the acceptance by the Patent Office of the drawings filed on April 9, 2002.

Applicant would like to thank Examiner Esaw Abraham for the personal interview conducted on March 19, 2005. In compliance with M.P.E.P. § 713.04, the substance of that interview is incorporated in the following remarks.

In the second section of the Office Action, claims 19 and 31 are objected to for certain informalities. These rejections are respectfully traversed.

According to M.P.E.P. § 2173.02,

> [t]he examiner's focus during examination of claims for compliance with the requirement for definiteness of 35 U.S.C. 112, second paragraph, is whether the claim meets the threshold requirements of clarity and precision, *not* whether more suitable language or modes of expression are available. . . . Some latitude in the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire. Examiners are encouraged to suggest claim language to applicants to improve the clarity or precision of the language used, *but should not reject claims or insist on their own preferences if other modes of expression selected by applicants satisfy the statutory requirement.* [M.P.E.P. § 2173.02 (emphasis added)]

Given the "latitude in the manner of expression and the aptness of terms" afforded to the Applicant, it is respectfully submitted that the aforementioned claims are clear and precise and fully comply with the requirements of 35 U.S.C. § 112, second paragraph. Consequently, Applicant respectfully submits that there is no statutory basis for the objections to the claims based on "informalities."

However, to facilitate prosecution in the present application, Applicant hereby amends claims 19 merely to change the phrase "is configured select a subset" to "is configured to select a subset," and amends claim 31 to change the phrase "is configured select a subset" to "is configured to select a subset." These amendments do not narrow or

otherwise limit the scope of the claims, are not made for any purpose related to patentability or to satisfy any statutory requirement, and are fully supported by the present application. No new matter has been introduced by way of these amendments. Accordingly, reconsideration and withdrawal of these grounds of objection are respectfully requested.

It is respectfully submitted that independent claims 19 and 31 are allowable. It is also respectfully submitted that dependent claims 20-30, 32-42 and 61-64, which variously depend from independent claims 19 and 31, are allowable.

During the interview, the rejection of claims 43-60, 65, 66 and 77-80 under 35 U.S.C. § 103(a) as allegedly directed to non-statutory subject matter was discussed. No agreement was reached. These rejections are respectfully traversed.

According to M.P.E.P. § 2106, "[t]he claimed invention as a whole must accomplish a practical application. That is, it must produce a 'useful, concrete and tangible result.'" [M.P.E.P. § 2106 (citations omitted)] Although the courts have yet to define the terms "useful," "concrete," and "tangible" in the context of the practical application requirement, several examples are given in the M.P.E.P. that illustrate claimed inventions that have a practical application, because they produce useful, concrete and tangible results. For example,

> transformation of data, representing discrete dollar amounts, by a machine through *a series of mathematical calculations* into a final share price, constitutes *a practical application of a mathematical algorithm, formula, or calculation,* because it produces "a useful, concrete and tangible result" – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades. [M.P.E.P. § 2106 (citing *State Street Bank & Trust Co. v. Signature Financial Group Inc.,* 149 F.3d 1368 at 1373, 47 U.S.P.Q.2d 1596 at 1601 (Fed. Cir. 1998)) (emphasis added)]

Customer No.: 28285

Additionally, a statutory process claim is illustrated as follows:

> [a] digital filtering process for removing noise from a digital signal
> comprising the steps of *calculating a mathematical algorithm to produce a
> correction signal* and subtracting the correction signal from the digital signal
> to remove the noise. [M.P.E.P. § 2106]

Claim 43 of the present application recites a method of *generating cyclic redundancy check (CRC) codes*. Claim 43 recites the steps of: a.) storing a first signal N times; b.) logically combining each stored first signal with one of an input signal and a selected signal M times; c.) selecting a subset of the N storing steps in response to a first selection signal, wherein each storing step of the subset of the N storing steps corresponds to a term of a pre-selected CRC polynomial; and d.) *selecting an output* of one storing step of the subset of N storing steps *corresponding to a length of the pre-selected CRC polynomial keyword*, in response to a second selection signal. Thus, just as in the digital filtering process example illustrated above, it is respectfully submitted that claim 43 produces a "useful, concrete and tangible result" in the generated CRC code.

The Patent Office asserts that since the method of generating CRC codes is not embedded in a computer readable medium, the invention recited in claim 43 is allegedly directed to non-statutory subject matter. It is respectfully submitted that the Patent Office is applying an incorrect and inappropriate test to determine whether the claims define statutory subject matter, and, therefore, is misapplying, misconstruing and misinterpreting the mandates and requirements of 35 U.S.C. § 101. As discussed previously, the appropriate test is whether the claimed invention as a whole produces a "useful, concrete and tangible result." As in the digital filtering process example illustrated above, it is respectfully submitted that claim 43 produces a "useful, concrete and tangible result" in the generated CRC code.

Customer No.: 28285

The Patent Office further alleges that the method recited in claim 43 is "only directed to mathematical algorithms rather than limited to practical applications." Contrary to the assertions of the Patent Office, the present application discloses that the universal CRC generator can be used "in a system that receives digital signals." [present application, page 4, lines 2-3] Furthermore,

> [t]he universal CRC generator can be programmed to be a specific polynomial key word CRC generator. Thus, one set of hardware can be adapted for any given polynomial key word. For example, for purposes of explanation, assume that a transmitter of a bitstream and a receiver of the same bitstream agree upon a key word that can be represented by the polynomial, $X^{16} + X^{12} + X^5 + 1$. The universal CRC can be programmed to be an $X^{16} + X^{12} + X^5 + 1$ polynomial key word CRC generator . . . . Each time that key word is changed, the universal CRC generator can be re-programmed to correspond to the new key word." [present application, page 4, lines 2-11]

Therefore, it is respectfully submitted that independent claim 43 defines statutory subject matter.

Independent claims 52, 77 and 79 recite features similar to those recited in independent claim 43, and, therefore, recite statutory subject matter for at least those reasons stated above with regard to claim 43.

Dependent claims 44-51, 53-60, 65, 66, 78 and 80 variously depend from independent claims 43, 52, 77 and 79, and recite statutory subject matter for at least those reasons stated above with regard to independent claims 43, 52, 77 and 79.

For at least the foregoing reasons, it is respectfully submitted that claims 43-60, 65, 66 and 77-80 define statutory subject matter in full and complete compliance with the mandates and requirements of 35 U.S.C. § 101. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

Customer No.: 28285

During the interview, the rejection of claims 1, 4-7, 13, 15 and 17 under 35 U.S.C.

§ 103(a) as allegedly being unpatentable over Mörsberger (U.S. Patent No. 6,560,746,

hereinafter "Mörsberger") in view of Derby (U.S. Patent No. 6,519,738, hereinafter "Derby")

was discussed. No agreement was reached. This rejection is respectfully traversed.

Exemplary embodiments of the present invention are directed to a universal cyclic

redundancy check (CRC) generator. More particularly, a universal N-bit capable CRC

generator is disclosed which can be programmed to adapt to any given polynomial key word.

For example, the universal N-bit capable CRC generator includes N shift registers that are

associated with corresponding exclusive OR (XOR) gates. Each of the shift registers

corresponds to a term of a general Nth order polynomial key word. Thus, by nullifying a

subset of the shift registers and their corresponding XOR gates, the universal N-bit capable

CRC generator can be converted into a specific polynomial key work CRC generator. The

selection of the subset of the shift registers and their corresponding XOR gates is based on

the desired polynomial key word. The universal N-bit capable CRC generator can be re-

programmed each time a new polynomial key word is desired. Thus, the universal N-bit

capable CRC generator according to exemplary embodiments can be dynamically

programmed to accommodate a new polynomial key word rather than having to build a new

CRC generator for each new polynomial word. [*see* present application, page 2, lines 15-29]

In complete contrast to the present invention, as understood by Applicant, Mörsberger

is directed to *specific* circuits that are designed and created for *each* CRC polynomial. As

disclosed by Mörsberger, "the designer selects the CRC code to be generated by selecting the

feedbacks, i.e. by selecting N and which of the coefficients a_n are 0 or 1 depending on the

desired CRC code. In the circuit in FIG. 1a this selection of coefficients a_n is reflected by the

feedback and the insertion of the particular XOR gates between respective two shift

registers." [Mörsberger, column 1, lines 58-63] For example, Figure 1B illustrates a specific

serial CRC generation circuit designed for the CRC polynomial given by the equation:

$CRC13 = X^{13} + X^{12} + X^7 + X^6 + X^5 + X^4 + X^2 + 1$. The circuit illustrated in Figure 1B is

designed to work with *only* the CRC13 equation. In other words, the circuit illustrated in

Figure 1B cannot be re-programmed to work with another CRC polynomial, as the circuit has

been designed to work with the CRC13 polynomial only. If another CRC polynomial is

used, *another separate* serial CRC generation circuit must be designed. Additionally, the

parallel CRC generation circuits disclosed by Mörsberger are designed for a *specific* CRC

polynomial. [*see* Mörsberger, column 3, lines 43-51] Consequently, if another CRC

polynomial is used, *another separate* parallel CRC generation circuit must be designed. As

acknowledged by the Patent Office, Mörsberger "**does not explicitly teach** programming

subset of XOR (logic gates) to have a value zero." [Office Action, page 6 (emphasis in

original)]

As understood by Applicant, Derby is directed to a method and system for computing

a CRC of a communication data stream taking a number of bits M at a time to achieve a

throughput equaling M times that of a bit-at-a-time CRC computation operating at a same

circuit clock speed. [*see* Derby, Abstract] According to Derby, the method includes the steps

of (i) representing a frame of the data stream to be protected as a polynomial input sequence;

(ii) determining one or more matrices and vectors relating the polynomial input sequence to a

state vector; and (iii) applying a linear transform matrix for the polynomial input sequence to

obtain a transformed version of the state vector. [*see* Derby, column 6, line 63 − column 7,

line 2] As disclosed by Derby, in step (ii), "the state vector can be represented by

$x(m+1)=A^M x(m)+B_M u_M(m)$, where A is a KxK matrix containing the coefficients of *a CRC*

generator polynomial, . . . where b is a K dimensional vector containing one or more

coefficients of *a CRC generator polynomial,* where B_M is a KxM matrix whose columns are

determined by multiplying b by successively higher powers of A, and where $u_M(m)$ is a

block oriented version of the input sequence." [Derby, column 7, lines 18-26 (emphasis

added)]

However, Derby discloses that "a CRC generator polynomial is invariably *chosen* to

be either an irreducible polynomial or the product of and an irreducible polynomial of degree

greater than one." [Derby, column 12, lines 23-25] Thus, in contrast to the present

application, it is respectfully submitted that Derby discloses that the CRC generator

polynomial is *static,* not dynamically programmable, being chosen for the particular

application.

Derby further discloses that

> [a] programmable CRC computation technique is one for which the generator
> polynomial can set by dynamic configuration or programming . . . . Known
> software-based parallel CRC computation techniques are generally *table-
> based* . . . ; *these are programmable if different tables are available
> corresponding to different generator polynomials.* . . . Because the optimum
> simplification will in all likelihood be different for different generator
> polynomials, a programmable hardware-based implementation using known
> techniques would require a separate exclusive-or array for each generator
> polynomial to be supported. In contrast, the technique being disclosed
> achieves speed-up even with the fully generic structures in FIGS. 4 and 5.
> The coefficients in these structures (h_k in FIG. 4, and β_{ij} in FIG. 5) can be
> configured dynamically, *so long as they have been precomputed off-line and
> stored for all the generator polynomials of interest.* [Derby, column 19, lines
> 3-24 (emphasis added)]

Thus, in complete and utter contrast to the present invention, Derby discloses that the CRC

computation can be made programmable using the known *table-based* technique of having

different tables corresponding to different generator polynomials. According to Derby, all of the generator polynomials of interest are pre-computed off-line and stored in the various tables. The desired CRC generator polynomial can then be retrieved from the appropriate table. It is respectfully submitted that *nowhere* does Derby disclose or even suggest the step of programming a subset of a plurality of registers to have a value of zero and programming a corresponding subset of a logic gates to have a value of zero, *wherein the step of programming is based on a pre-selected polynomial key word*. Accordingly, it is respectfully submitted that Derby does not address the above-identified deficiencies of Mörsberger.

Additionally, "[t]o establish a prima facie case of obviousness . . . there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." [M.P.E.P. § 2142] "There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." [M.P.E.P. § 2143.01] It is respectfully submitted the Patent Office has provided absolutely no reference, citation or other support, in Mörsberger, Derby or otherwise, for the bald and unsupported assertion that the proposed modification of Mörsberger with the teachings of Derby "would have been obvious because a person having ordinary skill in the art would have been motivated to do so because configuring or programming the CRC generator dynamically improves the efficiency of the CRC generation circuit and reduces the CRC computation time." [present Office Action, page 7] It is respectfully submitted that the Patent Office has failed to establish a *prima facie* case of obviousness. If this rejection is repeated, the Patent Office is requested to specifically

provide a reference, point out a citation, or provide credible support for such a bald and unfounded assertion.

Furthermore, "[i]f the proposed modification or combination of the prior art would change the principle operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." [M.P.E.P. § 2143.01] As discussed previously, Mörsberger discloses that a different CRC generation circuit (whether serial or parallel) must be *designed* and *built* for *each* specific CRC polynomial. To modify Mörsberger with the teachings of Derby in the manner suggested by the Patent Office (i.e., make the CRC generation circuits programmable) would fundamentally change the "principle of operation" of the invention disclosed by Mörsberger. Consequently, it is respectfully submitted that the Patent Office has not established a *prima facie* case of obviousness.

Rather, it is respectfully submitted that the Patent Office is using impermissible hindsight in an attempt to render the claims of the present application obvious. According to M.P.E.P. § 2142, "[t]o reach a proper determination under 35 U.S.C. 103, . . . impermissible hindsight must be avoided and the legal conclusion [of obviousness] must be reached on the basis of the facts gleaned from the prior art." Furthermore, according to M.P.E.P. § 2143.01, "[t]he mere fact that references can be . . . modified does not render the resultant combination obvious unless the prior art also suggests the desirability of [such modification]." [citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990)] Since the Patent Office has offered no proper support or motivation for combining the Mörsberger and Derby references, it is respectfully submitted that the rejection based on obviousness is wholly and completely founded upon "knowledge gleaned only from applicant's disclosure." [*see* M.P.E.P. § 2145]

Consequently, it is respectfully submitted that the rejection entails hindsight and is, therefore, improper.

Independent claims 13, 15 and 17 recite features similar to those recited in independent claim 1, and are, therefore, patentably distinguishable over the combination of Mörsberger and Derby for at least those reasons stated above with regard to claim 1.

Dependent claims 4-7 depend from independent claim 1, and are, therefore, patentably distinguishable over the combination of Mörsberger and Derby for least those reasons stated above with regard to claim 1.

For at least the foregoing reasons, it is respectfully submitted that the combination of Mörsberger and Derby does not render the subject matter of claims 1, 4-7, 13, 15 and 17 obvious. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

All of the objections and rejections raised in the Office Action having been addressed,

it is respectfully submitted that the present application is in condition for allowance and a

notice to that effect is earnestly solicited. Should the Examiner have any questions regarding

this amendment or the application in general, the Examiner is urged to contact the

Applicant's attorney, Andrew J. Bateman, by telephone at (202) 625-3547. All

correspondence should continue to be directed to the address given below.

Respectfully submitted,

By: _____

Andrew J. Bateman
Attorney for Applicant
Registration No. 45,573

IP Docket
Katten Muchin Rosenman LLP
1025 Thomas Jefferson St., NW
East Lobby, Suite 700
Washington, DC 20007-5201
Facsimile No.: (202) 298-7570
Customer No.: 28285